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| 10/516,889      | 12/03/2004  | Paul Alexander De Vries | APV31833            | 1709             |

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| EXAMINER |
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MCNELIS, KATHLEEN A

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| ART UNIT | PAPER NUMBER |
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1742

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08/30/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |  |  |  |
|------------------------------|--|--|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/516,889   | <b>Applicant(s)</b><br>DE VRIES ET AL. |  |
|                              | <b>Examiner</b><br>Kathleen A. McNelis | <b>Art Unit</b><br>1742                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 December 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/3/04 &amp; 12/29/04</u> . | 6) <input type="checkbox"/> Other: _____  |

### **Claims Status**

Claims 1-15 remain for examination wherein claims 1-13 are amended and claims 14 and 15 are new.

### **Examiner's Comments**

Please check and corrects spelling and grammar, e.g. claim 3 "...liquid is cooled at at least one spot" should probably be "in at least one spot".

### **DETAILED ACTION**

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11 recites the limitation "the length of the layer" in line 3. There is insufficient antecedent basis for this limitation in the claim.

#### ***Claim Rejections - 35 USC § 102***

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

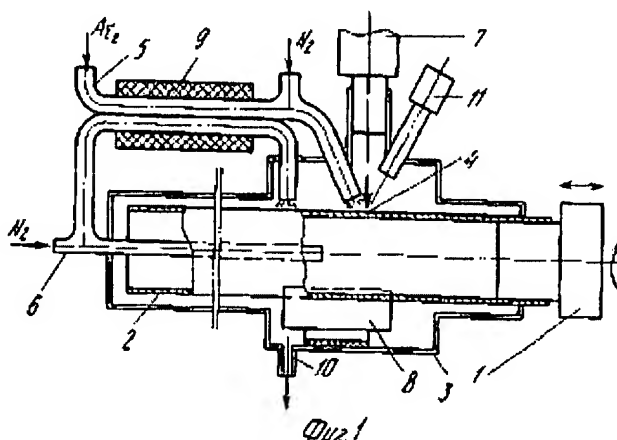
Claims 1, 3, 4 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Russian patent document 2 105 084 (RU '084)<sup>1</sup>.

With respect to claims 1 and 3, RU '084 discloses a method for forming a protective coating on the surface of metallic articles (e.g. Zr alloys) where the article is cooled with liquid

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<sup>1</sup> Based on English translation.

nitrogen (p. 2) while the article is melted in succession (e.g. with a laser beam) and a mixture of liquid nitrogen and inert gas is fed to the melting zone, forming a surface nitride (p. 3). RU '084 discloses that the liquid nitrogen contacts the layer of at most partially solidified molten metal (i.e. working zone (4)) above (claim 1) and near (claim 3) the layer of at most partially solidified molten metal (i.e. working zone (4)). Since only the surface of the work-piece is melted and recrystallized, and this is limited to discrete sections at a time, the method is broadly interpreted as meeting the preamble recitation of "fractional crystallization". Additional supply of nitrogen and argon at (4) would provide cooling of the cooling liquid in at least one spot near the layer of at most partially solidified molten metal.



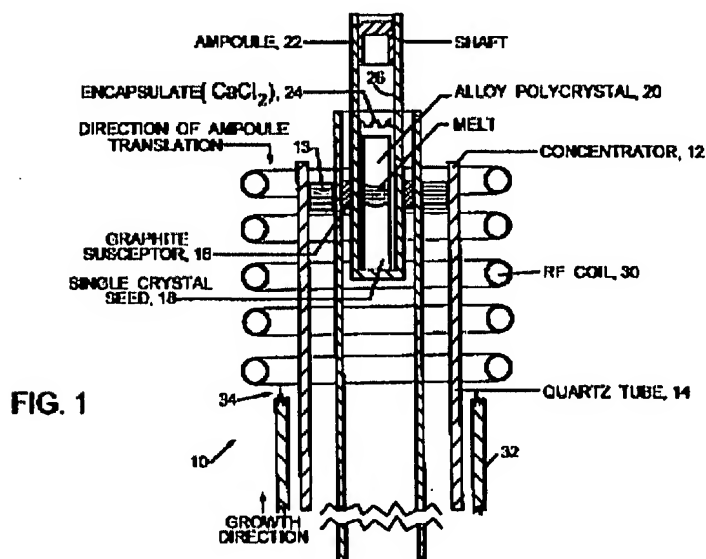
With respect to claim 4, RU '084 discloses transport of liquid nitrogen through pipelines 5 and 6 (p. 4 and Figure 1), which is relative to the layer of the at most partially solidified metal.

With respect to claim 6, RU '084 discloses rotation of the metal work-piece (p. 4 and Figure 1).

Claims 1, 3 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Bliss et al. (U.S. Pat. No. 6,143,070).

With respect to claims 1, 3 and 7, Bliss et al. discloses a method for growing single

crystals of SiGe by combining zone melting in a quartz container with a liquid encapsulation of molten salt to prevent nucleation at the container-melt interface (col. 2 lines 45-49). The process includes melting the Si-Ge charge, placing calcium chloride in solid form on top of the melt so that when it melts it covers the inner surface of the ampoule and crystal growth by a water-cooled concentrator located outside the ampoule (col. 1 line 47 – col. 2 line 25 and Fig. 1).



A temperature profile through the center of the melt zone (Figure 2) shows that the temperature decreases at the edges (i.e. location of melted salt), therefore lacking further limitation the molten salt is a cooling liquid and the concentrator provides cooling of the cooling liquid in at least one spot near the layer of at most partially solidified molten metal.

With respect to claim 4, the cooling liquid is transported (by melting) relative to the layer of at most partially solidified metal.

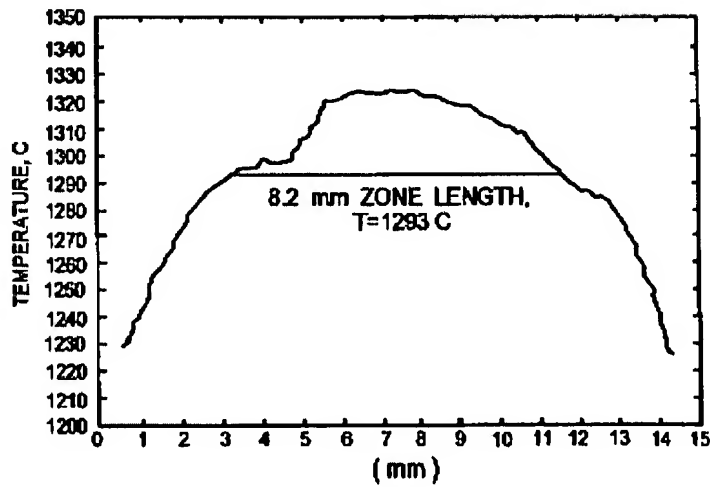
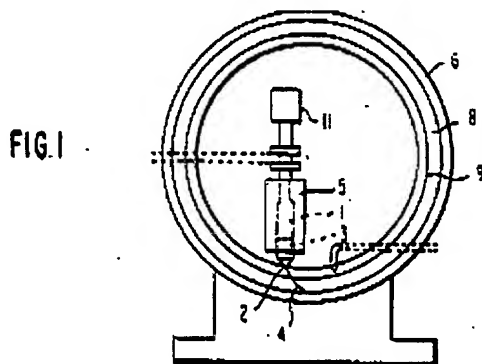


FIG. 2

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Masumoto et al. (U.S. Pat. No. 4,781,771).

Masumoto et al. discloses a method for manufacturing an amorphous Co-based metal filament by jetting a molten stream of the alloy (4) into a cooling liquid (8) for solidification (abstract, Figure 1). Since the metal alloy is injected in molten state, it is at most partially solidified during at least part of the time it is in contact with the cooling liquid. The recitation "fractional crystallization" in the preamble has not been given patentable weight since it will not affect the structure of the product.



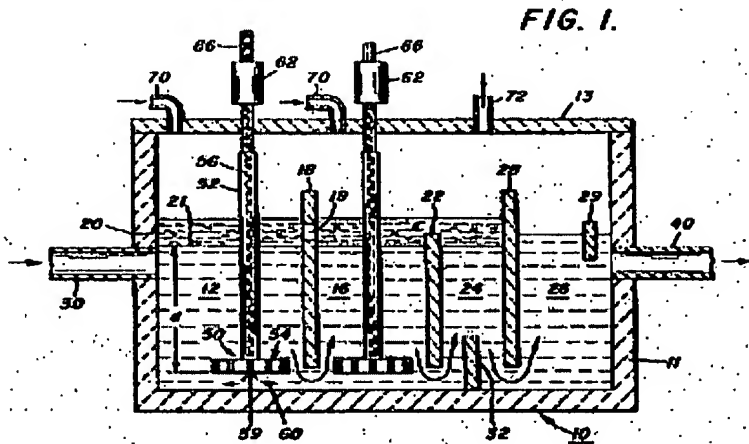
Claims 1, 2, 7 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Beguin et al. (U.S. Pat. No. 4,099,965).

With respect to claims 1, 2, 7 and 12, Beguin et al. discloses a method for purification of aluminum with a flux of  $\text{MgCl}_2$  and KCl (i.e. a salt) to remove alkali and alkaline earth metals (abstract) where the flux having a lower melting point than aluminum (col. 1 lines 55-65) is introduced in one embodiment as a solid to the bottom of an aluminum melt (col. 2 lines 7-22). While not recited in Beguin et al., the flux would be expected to melt, since its melting temperature is lower than aluminum and it is exposed to molten aluminum. Further, since the aluminum would transfer heat to the flux, the flux would in turn cool the aluminum. Since Beguin et al. discloses removal of alkali and alkaline earth metals, the method is broadly interpreted as fractional crystallization. The molten aluminum of Beguin et al. meets the limitation of an at most partially solidified molten metal.

Claims 1, 4, 6-10, 13 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Bruno et al. (U.S. Pat. No. 3,839,019).

With respect to claims 1, 7-10, 12 and 13, Bruno et al. discloses a method for aluminum purification by chloridizing molten aluminum (abstract) with a molten salt formed from the chloridization reaction products of the metallic impurities, including magnesium (col. 2). Although Bruno et al. does not recite that the method is for fractional crystallization; since Bruno et al. discloses removal of Mg from Al before solidification this has been broadly interpreted as fractional crystallization. Further, although Bruno et al. does not recite that the salt layer is a cooling liquid, lacking further limitation or definition it has been interpreted as such because heat loss would be expected through the salt layer to the atmosphere.

With respect to claim 6, Bruno et al. Fig. 1 shows that the aluminum is transported relative to the cooling liquid (i.e. salt).



With respect to claim 8, Bruno et al. Fig. 1 shows multiple (2) compartments that communicate with opening (19) (col. 3) near the layer of the cooling liquid.

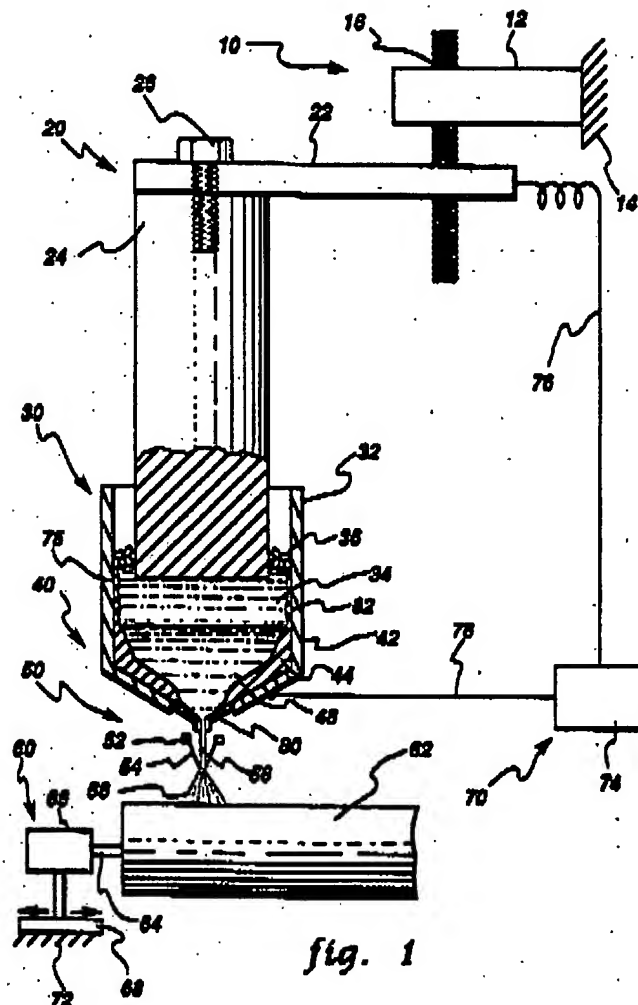
With respect to claims 9 and 10, Bruno et al. discloses stirring each of the two compartments with impellers (Figure 1, (54)).

With respect to claim 15, lacking further limitations for “all compartments” Bruno et al. is broadly interpreted as meeting this limitation by disclosing stirring in each of two compartments.

Claims 1, 3, 6, 7 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Benz et al. (U.S. Pat. No. 5,160,532).

With respect to claims 1, 3, 6, 7 and 11, Benz et al. discloses a method for electroslag refining an ingot (24) where the ingot is heated (74) and covered in a molten salt (34), forming a melt pool beneath the molten salt (46) (col. 10 and Fig. 1). Since the molten salt purifies the melt pool, the method is broadly interpreted as meeting the limitation of “fractional crystallization”. The molten (34) or granular (36) salt (i.e. slag) is added in a cooled reservoir (32).





*Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 5 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Russian patent document 2 105 084 (RU '084).

RU '084 is applied as discussed above regarding claim 1.

With respect to claims 5 and 14, although RU '084 does not specifically recite recycling the cooling liquid (claim 5) or recycling and cooling the cooling liquid (claim 14), such would have been obvious to one of ordinary skill in the art at the time the invention was made for the obvious reason of saving the cost of nitrogen and providing the desired temperature of  $-196^{\circ}\text{C}$  (p. 4).

Claims 5 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bliss et al. (U.S. Pat. No. 6,143,070) or Beguin et al. (U.S. Pat. No. 4,099,965).

Bliss et al. or Beguin et al. is applied as discussed above regarding claim 1.

With respect to claims 5 and 14, although Bliss et al. or Beguin et al. does not specifically recite recycling the cooling liquid (claim 5) or recycling and cooling the cooling liquid (claim 14),

such would have been obvious to one of ordinary skill in the art at the time the invention was made for the obvious reason of conserving costs for purchase of the salts as well as costs associated with disposal of such if not recycled. Cooling would have been obvious in view the disclosure in Bliss et al. or Beguin et al. that the salt is added as a solid.

Claims 5 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masumoto et al. (U.S. Pat. No. 4,781,771).

Masumoto et al. is applied as discussed above regarding claim 1.

With respect to claims 5 and 14, although Masumoto et al. does not specifically recite recycling the cooling liquid (claim 5) or recycling and cooling the cooling liquid (claim 14), such would have been obvious to one of ordinary skill in the art at the time the invention was made for the obvious reason of conserving costs for purchase and disposal (or treatment) of water if not recycled. Cooling would have been obvious in view the disclosure that the water is used for cooling purposes.

Claims 5 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benz et al. (U.S. Pat. No. 5,160,532).

Benz et al. is applied as discussed above regarding claim 1.

With respect to claims 5 and 14, although Benz et al. does not specifically recite recycling the cooling liquid (claim 5) or recycling and cooling the cooling liquid (claim 14), such would have been obvious to one of ordinary skill in the art at the time the invention was made for the obvious reason of conserving costs for purchase of the salts as well as costs associated with disposal of such if not recycled. Cooling would be provided by the cooling reservoir (32).

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-15 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, 5 and 9-12 of copending Application No. 10/516888 (‘888). Although the conflicting claims are not identical, they are not patentably distinct from each other because:

With respect to instant claims 1-5, 7-12, 14 and 15, ‘888 claim 1 discloses a method for fractional crystallization of an at most partially solidified molten metal with upper surface and lower surface by dividing into a series of compartments in which the metal is stirred and crystals formed are selectively transported in an opposite direction of the metal. ‘888 Claim 5 discloses that a layer of transporting liquid, preferably a molten salt, is present below and/or above the layer of metal to selectively transport the crystals, therefore “only present below the layer” is within the scope claimed by ‘888. ‘888 Claim 2 discloses that a temperature difference is present of the length of the metal layer, the higher temperature being present at the end of the metal layer to

which the crystals are transported. Lacking further definition of “cooling liquid” the transporting liquid of ‘888 is broadly interpreted as a cooling liquid. ‘888 Claim 9 discloses stirring in at least some of the compartments, therefore stirring in all compartments is within the scope disclosed by the claims of ‘888.

With respect to instant claims 5 and 14, although not recited in the claims of ‘888, recycling of the molten salt would have been obvious to one of ordinary skill in the art at the time the invention was made for the obvious reasons of conserving costs for purchase of the molten salts as well as costs associated with disposal of such if not recycled. Cooling would have been obvious in view of the temperature requirements for fractional crystallization as recited in ‘888 claims 1 and 2.

With respect to instant claim 6, ‘888 claim 1 recites that the metal and crystals are transported in opposite directions and ‘888 claim 5 discloses that the molten salt (i.e. cooling liquid) transports the crystals, therefore ‘888 teaches transporting the molten metal relative to the layer of cooling liquid.

With respect to instant claim 11, the claims of ‘888 do not recite the limitation that the at most partially solidified molten metal is added between both ends of the length of the layer of at most partially solidified molten metal, however such would be expected since ‘888 claim 1 recites that at most partially solidified molten metal is subjected to fractional crystallization by transporting through a series of compartments. The at most partially solidified molten metal would obviously be added to at least one point between both ends of the layer of at most partially solidified molten metal. ‘888 Claim 10 discloses that the molten metal and/or crystals are removed at the end of the layer of metal towards which the crystals are selectively transported, and ‘888 claim 1 recites that the metal is transported in the opposite direction.

With respect to instant claim 12, '888 claim 11 discloses aluminum.

With respect to instant claim 13, '888 claim 12 discloses Cu, Fe, Ga, Mg, Mn, B, Si, Sn, Zn and Ni.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571 272 3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KAM  
08/27/2007

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